Geophysical Research Abstracts
Vol. 15, EGU2013-10731, 2013
EGU General Assembly 2013

3D tracer advection in polar ice sheets: modeling stratigraphy and isotope distributions in Greenland & Antarctica

Johannes Sutter, Gerrit Lohmann, Malte Thoma, Dirk Barbi, and Martin Werner

Alfred-Wegener-Institute for Polar and Marine Research, Bremerhaven, Germany (johannes.sutter@awi.de)

Relative abundances of the O^{16} versus the O^{18} isotopes precipitated with snow on the polar ice sheets leave an echo of past climatic conditions, which can be read by retrieving and analyzing ice cores. When experimental tools to reproduce ice core chronologies fail due to layer thinning and advection processes, interpretation of ice core data can be supported by ice sheet modeling. We pursue the reconstruction of stratigraphic patterns and isotopic distributions of the Greenland and Antarctic ice sheets by means of 3D ice sheet modeling. For this purpose two advective transport models (Euler & Lagrange) where implemented in the 3D ice sheet model (ISM) RIMBAY based on Pattyn (2003). The ability of the transport schemes to reproduce stratigraphic features is evaluated in simple diagnostic model runs including synthetic ice sheet geometries as well as full scale simulations of the Greenland and Antarctic ice sheets covering the last glacial cycle. As a next step the ISM is driven by an atmospheric circulation model equipped with an explicit isotopic water cycle. By comparison of model results to Greenland ice core data we pursue an evaluation of the applied models potential to reproduce past circulation patterns during glacial-interglacial transitions, as well as to investigate their fingerprint on the isotopic distribution in the Greenland ice sheet.